

**WHAT IS CLAIMED IS:**

1. A narrow-band amplifier which comprises:
  - a narrow-band amplifier comprising a quadrature detector, integrators, and a vector modulator, said narrow-band amplifier resolving
  - 5 input signals into in-phase components and quadrature-phase components by means of said quadrature detector, integrating said in-phase components and said quadrature-phase components by means of said respective integrators, vector-modulating said integrated in-phase components and said integrated quadrature-phase components by
  - 10 means of said vector modulator, and outputting the vector signals;
    - a first signal source which feeds a first sine-wave signals to said quadrature detector,
    - a second signal source which feeds a first cosine-wave signals orthogonal with the first sine-wave signals to said quadrature detector,
    - 15 a third signal source which feeds a second sine-wave signals to said vector modulator,
    - a fourth signal source which feeds a second cosine-wave signals orthogonal with the second sine-wave signals to said vector modulator,
    - said first, second, third, and fourth signal sources are signal
    - 20 sources that numerically control the output signal frequency and phase by a controller, with the output signals being updated once their respective pre-determined wait times have passed after control by said controller, and

said controller controls said first, second, third and fourth signal sources before the time when they are about to be synchronized by said pre-determined wait times so that the times when the output signals of said first, second, third, and fourth signal sources are updated are all  
5 synchronized.

2. The narrow-band amplifier according to claim 1, wherein the signals that are fed to said quadrature detector and said vector modulator are controlled so that a state in which the output signals of  
10 said integrators are stable is maintained.

3. The narrow-band amplifier according to claim 1, wherein the phase difference between said first sine-wave signals and said second sine-wave signals is adjusted by controlling said first signal  
15 source, and the phase difference between said first cosine signals and said second cosine signals is adjusted by controlling said second signal source.

4. The narrow-band amplifier according to claim 1, further  
20 comprising:

a clock source, wherein said clock source feeds clock signals to the first, second, third, and fourth signal sources, and wherein said pre-determined wait time is determined by the period of said clock signals.

5. An impedance measuring apparatus which comprises:

a signal source connected to the first terminal of a device under test;

a feedback amplifier that is connected to the second terminal of said device under test to keep said second terminal at virtual ground and converts current signals that flow to said device under test to voltage signals and outputs said voltage signals, said feedback amplifier comprising a narrow-band amplifier;

means for determining the vector voltage ratio of the voltage signals between said first and second terminals and the output signals of said feedback amplifier, and that measures the impedance of said device under test from said vector voltage ratio, wherein said narrow-band amplifier comprising a quadrature detector, integrators, and a vector modulator and resolving input signals into in-phase components and quadrature-phase components by means of said quadrature detector, integrating said in-phase components and said quadrature-phase components by means of said respective integrators, vector-modulating said integrated in-phase components and said integrated quadrature-phase components by means of said vector modulator, and outputting the vector signals;

a first signal source which feeds a first sine-wave signal to said quadrature detector;

a second signal source which feeds a first cosine-wave signal  
orthogonal with the first sine-wave signals to said quadrature detector,

a third signal source which feeds a second sine-wave signal to  
said vector modulator,

5 a fourth signal source which feeds a second cosine-wave signal  
orthogonal with the second sine-wave signals to said vector modulator,  
wherein said first, second, third, and fourth signal sources are signal  
sources that numerically control the output signal frequency and phase  
by means of a control means, with the output signals being updated once  
10 their respective pre-determined wait time has lapsed after control by said  
control means; and

said control means which controls said first, second, third and  
fourth signal sources before the time when they are about to be  
synchronized by said pre-determined wait time so that the times when  
15 the output signals of said first, second, third, and fourth signal sources  
are updated are all synchronized.

6. The impedance measuring apparatus according to claim 5,  
wherein the signals that are fed to said quadrature detector and said  
20 vector modulator are controlled so that a state in which the output signals  
of said integrators are stable is maintained.

7. The impedance measuring apparatus according to claim 5,  
wherein the phase difference between said first sine-wave signals and  
said second sine-wave signals is adjusted by controlling said first signal  
source, and the phase difference between said first cosine signals and  
5 said second cosine signals is adjusted by controlling said second signal  
source.

8. The impedance measuring apparatus according to claim 5,  
further comprising:  
10 a clock source which feeds clock signals to the first, second, third,  
and fourth signal sources, and wherein said pre-determined wait time is  
determined by the period of said clock signals.

9. An impedance measuring apparatus comprising:  
15 a signal source connected to a first terminal of a device under test;  
a feedback amplifier that is connected to the second terminal of  
said device under test to keep said second terminal at virtual ground and  
that converts current signals that flow to said device under test to voltage  
signals and outputs these voltage signals, said feedback amplifier  
20 comprising a modulation-type narrow-band amplifier comprising a  
quadrature detector and a vector modulator;  
means for determining the vector voltage ratio of the voltage  
signals between said first and second terminals and the output signals of

said feedback amplifier, and that measures the impedance of said device under test from said vector voltage ratio;

a first signal source which feeds a first sine-wave signal to said quadrature detector;

5 a second signal source which feeds first cosine-wave signal orthogonal with the first sine-wave signals to said quadrature detector;

a third signal source which feeds a second sine-wave signal to said vector modulator,

a fourth signal source which feeds a second cosine-wave signal  
10 orthogonal with the second sine-wave signal to said vector modulator,

said first, second, third, and fourth signal sources are signal sources whose output signal frequency and phase are numerically controlled by means of said control means, and

said control means adjusts the phase difference between said first  
15 sine-wave signals and said second sine-wave signals by controlling said first signal source and adjusts the phase difference between said first cosine-wave signals and said second cosine-wave signals by controlling said first signal source.